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TWO LOWCOST OPERATIONAL CONCEPTS ABSTRACT

The Cassini Mission to Saturn plans to employ several concepts to decrease the complexity of Mission Operations and to maximize science return in a constrained cost environment. These concepts have been implemented to reduce cost, increase productivity and eliminate duplication of knowledge and effort. Two of these concepts are referred to as operational Modes and the Uplink Operations Virtual Team. A proof of concept study has been performed to validate these two concepts for the Cassini project.

The Operational Modes concept is based on the idea of defining a set of instrument and engineering resource envelopes. These envelopes allow spacecraft activities to be checked for resource usage (such as power, and data rate) against the envelope boundaries. Operational Modes allow scientists the flexibility to schedule any observation as long as the observation stays within these envelopes. The scientist has the responsibility to check that the observation stays within these limits. Checking at the Operational Mode level reduces the effort expended by the operations team because there is less detail to check.

The second concept is the Uplink operations Virtual Team. The Uplink operations Virtual Team is comprised of a full time core of sequence experts and a variable number of spacecraft and instrument experts. The number of spacecraft and instrument experts is based on the contents of the sequence. A sequence is a set of time ordered instrument and spacecraft commands. This team develops, reviews, approves, and monitors the sequence. For this concept, the requestor has the responsibility for doing the most detailed checking. This person has the knowledge, to do checking at this level. An Uplink operations virtual team exists from the start of planning to the end of sequence execution.

The proof of concept study simulates the workings of the Uplink operations Virtual Team using Operational Modes, a sample 16-day orbit provided by mission design and existing software. For the study, the software was adapted to the Cassini project. Sample science and engineering inputs were merged together to become a constraint-checked sequence. The Uplink Operations Virtual Team tasks are to collect, merge, apply Operational Modes to constraint check the inputs, and create, a complete sequence. Successfully performing these tasks verifies the feasibility of using the two operational concepts.

This paper presents the results of the proof of concept study and examines the software needs required to implement these concepts. Finally, it provides suggestions on what is needed to implement this approach in a cost-capped environment. The work described in this abstract was performed by the Jet Propulsion Laboratory, California Institute of Technology, under contract to the National Aeronautics and Space Administration.